

AN
INTRODUCTORY LECTURE
ON THE
RELATIONS OF CHEMISTRY
TO THE
VITAL FORCE;

DELIVERED IN THE
PHILADELPHIA COLLEGE OF MEDICINE.

BY
D. P. GARDNER, M. D.
Professor of Chemistry and Medical Jurisprudence.

PUBLISHED BY THE CLASS.

SESSION OF 1847-48.

PHILADELPHIA:
JOHN H. GIHON, PRINTER,
NORTH EAST CORNER OF SIXTH AND CHESNUT STREETS.

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Hand
Box 3

PHILADELPHIA, NOVEMBER 16, 1847.

PROF. D. P. GARDNER, M. D.

SIR,

At a meeting of the Students of the Philadelphia College of Medicine, held November 15th, the undersigned were appointed a Committee to request for publication, the very able and interesting Introductory Lecture delivered by you at the opening of your course for the present session. We therefore respectfully request a copy for said purpose, by complying with which you will confer a great favor on the class.

Very Respectfully,

Your Obedient Servants,

N. RICHARDS MOSELEY, of Penn.,

C. DWIGHT PRESTON, of Conn.,

THOMAS KENNEDY, of Va.,

L. G. VINAL, of Me.,

W. Z. W. CHAPMAN, of Mass.,

E. J. RECORDS, M. D., of Del.,

E. BENTLY HALL, of N. J.,

E. de St. ROMES, of La.,

G. W. LOMAX, of S. C.,

J. C. HATHEWAY, of N. B.,

A. P. GROSVENOR, of N. Y.

PHILADELPHIA, NOV. 17TH, 1847.

GENTLEMEN:

I have to acknowledge the receipt of your letter asking for publication, in the name of the Medical class, a copy of my Introductory Lecture.

In complying with your flattering request allow me to add an expression of the deep interest I feel in the prosperity of each member of the class, who may listen to my lectures this winter.

With sentiments of esteem, believe me,

Yours truly,

D. P. GARDNER.

To Messrs. N. RICHARDS MOSELEY, &c.

INTRODUCTORY LECTURE.

GENTLEMEN :

Associations, too pleasing to be repressed, gather around as I stand before you. A few years since, from the midlands of Virginia, within the shadows of the Blue Ridge, like you I sought this city to slake my thirst at the fountains of medical lore. Your presence and objects recall the companions of those days, many of whom have left a deep impression on my affections, some have passed from these transitory scenes—peace be with them. Again I come to tread the pleasant ways of science, with interest unchecked by time ; with hopes undimmed by many disappointments. For we are alike students ; between us a short gap of years that have sped their arrowy flight, alone exists. Time has brought more caution, but the heart that warmed at the altars of science is unchanged, still kindles with the emulation of the student, still feels deep sympathies with those who toil on the weary and narrow way of truth.

In that short period change has been active elsewhere. The bustling aggregate of humanity has enacted its accustomed farce. Speculation has blown his bubbles, and called upon the world to note their symmetry and play of colors, as the frail things vanished into air. The “dogs of war” unkennelled, have filled the earth with clamors. Presidents and Emperors have put forth mandates and strutted their brief hour upon the stage. Everywhere has change been, even here in the halls of medicine ; and he whose deep knowledge, whose persevering pursuit of science have gained him the honorable title of the father of American chemistry, has, after thirty years of toil, withdrawn from his labors. Vigorous in body and intellect, long may he adorn the scenes of his researches, long may the rays of his reputation add brilliancy to the fame of my alma mater.

In this time medical schools have been formed and been extinguished, and here in lusty youth the PHILADELPHIA COLLEGE OF MEDICINE has come forth to enter the lists. For we know that in the liberal rivalries of the profession, a carefully arranged plan, honestly sustained by the best energies of men, studious of the interests of the pupil, and mindful of the claims of the profession, is entitled to success. We have sought, whatever may be our fate, to deserve success.

Chemistry, in this period has attained a striking development, and its applications to medicine have become definite. No longer restricted to the art of grinding in a mortar, or making cosmetics and lip salve, it has edged its way into the studies of the physiologist, it has brought new interest into therapeutics and pathology, and well nigh been the death of many a routine doctor practising in the light of a clouded imagination, or in the ray vouchsafed by the phosphorescence of antiquity. By this advance it has become unrivalled in the sublimity of its researches. The functions of the body, the relations of life to death, the processes which develop, control, or overwhelm existence, are the natural fields of its enquiries. If these

investigations be of moment to the physician, they are to be pursued only through a knowledge of this science; without it the common hypotheses furnish but only a shadowy metaphysical explanation, unsatisfactory and meagre at best. To neglect this study is to lose the best insight we possess of the operations of life and in forming a rational diagnosis. If chemistry has not been looked upon as one of the corner stones in the medical edifice, it is because its applications to physic have not been sufficiently taught, for the fault is not with the science.

Nor is it less allied to the beautiful than to the sublime. Its facts throw a pleasing veil of poetry over familiar things; it tinges the vapors and the waters with brightness; it peoples the air with the shadowy groups of the past; it gives life to the cold clouds of the valley; it endows the impalpable with power. The fleecy clouds floating in the air, and vanishing when touched by that arch-magician the sun, are to the chemist objects of no common interest. The vicissitudes of climate, and of life are sketched on their aerial expanse; there are mingled the exhalations of the tropic, rising from scorching plains, and the thin distillations of the arctic; vapours redolent with the sighs of the weary and the oppressed, and with the aspirations of the brilliant and ambitious. The evening wind comes on from distant lands mingling the air of the sunny south and the north; it has traversed strange countries, and journeying onwards, has caught up moisture from the forest lake to refresh the thirsting flowers of the mountain side, and now it strays in the ringlets, and breathes on the lips of the disconsolate fair. Ah! did she know that it bears the last breath of him who loved her—the hero who sank in victory on the plains of Mexico.

But the thoughts of the chemist, unlike those of the poet, are expressions of realities. He perceives facts more striking, truths more touching and beautiful in nature, than all the visions of the dreamer. Not with gross matter only is his intellect associated, his labors are not bounded by the physical properties of objects, but from the exterior his new sense penetrates to the centre, and becomes cognizant of surrounding and distant effects. The yellow rays of light, which have built up the corn plant, and given food to man, have worked out their destiny millions of miles from their source. In fine undulations, of which there are myriads in an inch, that powerful agent has traversed the profound abysses of space, and made itself felt on earth for life or death. Unlike the metaphysician and poet, his art is not to envelope in mystery; no troupes of fantastic fairies, no malignant sprites, neither Sylph nor Gnome are of his council; it is his appointed task to scatter superstitions and the fanciful to the winds, to develop the sublime truths, that *the atomic government of the universe is the essence of the beautiful*, that the laws of nature work out harmonious results with marvellous simplicity. Chemistry is the science of atoms; a dominion how vast! In it all nature is included; not the rock, the wave, the tempest, and the storm only, but life in all its forms—life which is universal, which fills all space—

“See through this air, this ocean, and this earth,
All matter quick, and bursting into birth.
Above how high progressive life may go!
Around how wide! how deep extend below!
Vast chain of being which from God began,
Natures, etherial, human, angel, man,
Beast, bird, fish, insect which no eye can see,
No glass can reach: from infinite to thee,
From thee to nothing.”

Life! what a strange influence has this word, what a shadowy meaning! Well have all men looked with awe and superstition on a condition so uncertain and mysterious! From whence? whither tending? how sustained! a deep reverence, a shrinking back of the mind from a theme so dark and overwhelming has characterized all mankind.—Around the enquiry have been grouped dire superstitions and chimeras, until the student, aghast with terror, has fallen back from the investigation and never attempted again the adventurous way “which to those horrors led.” To some a glimpse has brought the strange conviction that matter has no existence, and that the ideal only is the real. Others have reached the unwelcome conclusion that life is a supernatural condition, a state of force opposed to the material world, tottering at best, and rushing to destruction; continually surrounded by pestilence, by ambushed enemies in every stone, and shrub, and flower. To such life is a marvel; a state subject to horrid foreboding and speedy annihilation. The natural condition of the earth, in the philosophy of this numerous class, is that of a cold, gloomy, spiritless mass. That the life of individuals is painfully precarious is readily allowed, but that the aggregate vitality of the globe is in a state of force and supernatural, cannot be conceived; for it is opposed to all experience. Is it agreeable to the plan of an infinite and beneficent system, that this highest condition of matter, this marvellous and intricate result, should alone be instable, when all things else are governed by periodical and inflexible laws? Has the Omnipotent Power, who, operating by the laws of nature, rules the elliptical flight of myriads of worlds, more ample, more peopled than this—and yet marks a sparrow’s fall, to whom no thought is unknown—left living nature out of his grand Providence? It is not for speculation to answer; it is not for metaphysics to determine. If we would learn what life is or what its course, we must search in the records of the known, or not at all; we must be content to reach conclusions here, as in every investigation of truth, by induction from many facts.

Life, so far as this earth is concerned, is a natural condition of matter. It results when certain chemical combinations are produced, is influenced by physical laws, and cannot be for one moment opposed to them without suffering. There is much which is recondite, much which is imperfectly understood, but nothing that is more supernatural in this condition than in the effects of light or electricity. The same molecules which are scattered through the air, the same dust we tread on, are the constituents of the living machine, combined together by universal laws, and not by peculiar forces, differing in nothing from inanimate matter but the complexity of the atom and the cellular figure. Hence, the capacity of producing life, results from a certain form of matter, as certainly as heat, light, or electricity are the resultants of other conditions. Like them, life is an imponderable force, present in all things, pervading all space, and indestructible. Like them it is latent or manifest, and always to be thrown into activity by appropriate excitation. Nothing material, no force of nature is capable of annihilation. The heat which has cherished the forest oak, the light which by imperceptible undulations has organized its juices, are not lost in the massy trunk, but latent; when in the lapse of time, by slow decay or by combustion, the atoms of that ancient tree are loosened, the light and heat shall also be made manifest. The coal fire, which invigorates the body, is throwing out the identical rays absorbed by primeval forests from the sun, in ages too remote to be comprehended. The fine dust of infusorials in the cabinet of the naturalist, dry and almost impalpable, taken from recesses where it had been stored beyond the influ-

ence of the proper exciting causes, swarms into life when touched by a drop of water, awakening from the silence of ages. The pious offering of wheat made by the Egyptian as a propitiatory gift to Isis, taken from its mountain sepulchre and committed to the earth, with proper care, springs into life after the inactivity of three thousand years. Life then may be latent for centuries and undiscoverable except by peculiar means. Of this extraordinary truth you will find numerous instances in the valuable and instructive essay of Mr. P. A. Browne, of this city, on animal torpidity and hybernation.

Wherever a determinate combination of certain elements and the cellular figure are present, there the capacity to live is also. It is not in complex organs, in separated senses, in the perfection of vision, in a nice apparatus for the detection of sounds or odors, nor in members for locomotion, that life is alone manifested. These are improvements in the machinery but not in the agent, nor are they essential to the manifestation of a high degree of vitality. There may be found, during the summer, attached to the rootlets of the duckweed, little masses of a gelatinous substance; these are the creatures called *Hydræ*. It will be seen that the body is a clear, apparently homogenous jelly, the form rudimentary, consisting of a stem and a small sack surrounded by a few thread-like tentacula. Touch the water in which they sport, the creatures cease to move and fold themselves into minute spheres, conscious of danger, possessed of the instinct to avoid it. Observe how they climb the sides of the vessel by their tentacula; how they move on a plain by a series of rapid somersets; with what skill they swim; how they suspend themselves from the surface of the liquid, watching for prey; man's capacity for locomotion is nothing to that of this animated speck. See the contentions of two who have some cause of quarrel; how they dart on each other and wrestle! Of what do they dispute? There is no apparent object of contention to justify so much strife—is it mere ill nature, the pride of strength, or a question in politics? Here are the perfection of locomotion, a capacity for enjoyment, anger, stratagem, self-preservation, fear, exquisite sensation, apparently sight, in a dot of jelly. But take a needle and break one of them into a hundred atoms, and each dilates into a new animal, vigorous and subtle as its parent. And why? Because the homogeneous cellules are each endowed with all the vitality of the hydra, which gains in its tentacula and stem only mechanical implements, not additional life. *What vital quality is here, and it is equal to the highest manifestation, is the property of every atom.* The separation of the senses into appropriate organs, adds to the convenience of the larger animals, but it cannot be shown that vitality is thereby increased. In all cases there is a nice adaptation perceptible between the organization and the wants of the being. The field of vision of the insect is but a point compared to that of man, but that minute space is ample for all his wants; to him it is a world rich in varied interest, creatures unseen by us are there disporting, tints, inappreciable to our gross sense light up every object—*there is a new universe in that point.* A world of music, a world of sensation lie around us, full of life, but which our organization cannot appreciate. Nor is this a subject of regret, for to possess this power would debar from greater; would reduce the body from the position assigned it as the tabernacle of the soul. Thus the poet:

"Why has not man a microscopic eye?

For this plain reason, man is not a fly.

Say what the use, were finer optics given,

To inspect a mite, not comprehend the heaven?

Or touch, if tremblingly alive all o'er,
 To smart and agonize at every pore ?
 Or quick effluvia darting through the brain,
 To die of a rose in aromatic pain?"—POPE.

So far as the properties of mineral and organic matter can be compared, there is not much dissimilitude. Living objects may not be larger than the ultimate atoms of bodies. The Rev. Mr. Reade states that forty-one thousand millions of Gaillonellæ occupy but a cubic inch, and Ehrenberg that ten thousand thousand millions of Bacillariæ are necessary to fill the same space, and each particle of these animals is living and characterized by the cellular figure. *Hence, it would appear that the property of life belongs to matter the ultimate atoms of which are cellular and distinguishable from the solid spheroids of inanimate substances.* Again, if in the development of a crystal, millions of particles can be arranged in a symmetrical position during a short time, so in the multiplication of living things millions can be born in an hour. The eminent microscopist, Ehrenberg, has shown that from one almost imperceptible corpuscle, the Gaillonellæ increase in four days to 170 billions, and occupy a space of two cubic feet. Thus vital matter may be as minute as elementary atoms, as rapidly formed from mineral substances as a crystal can be deposited, may remain centuries inactive, and seems to be characterized by no peculiar physical properties. Moreover, nearly if not all the elements can become the constituents of living cellules.

How then does the vital condition originate ? We are told that it is supernatural, metaphysical. Impregnate distilled water with carbonic acid, add a drop of yeast, leave a little air in the bottle, and seal, expose to sunlight in the summer, and it will be found in a few days that a rich green vegetation has made its appearance. Dissolve an organic acid, or any of its salts, and before long there will be developed a fleecy conferva. In a fermenting solution of sugar, saccharomyces originate. Vegetable infusions in a few hours swarm with animalcules. In such cases it is impossible to discover anything more than a suitable condition of matter, arising not from supernatural agency, but from a peculiar grouping of the atoms, for there can be no seeds present. But in creatures which possess a more complicated frame-work, a cellule or aggregate of cellules is the parent, and this appears to be necessary to perpetuate the mechanism. Reproduction by germs is not an essential characteristic of vitality, for hundreds of genera perpetuate their species by fissiparous generation.

Nor is living matter beyond the control of the ordinary forces of nature, as we have been assured. It is a set phrase with the physiologist, that the body during life resists the solicitations of chemical affinities, which surround it on all sides, and finally triumph in the death of the animal. But how can this be so, when every change in the body, whether of nutrition or secretion, is a chemical process ? It is the fate of all complex substances, whether mineral or organic, to be perpetually subject to destruction. For the maintenance of life, as in the preservation of every compound form of matter, the physical conditions which environ the body, must be suitable. Nor is death a result of the least deviation from the normal ; the health and vigor are interrupted long before the stage of destruction is reached. Those races of men who tempt the inclemency of the polar regions, forfeit their stature ; the tribes of the tropics, oppressed by the heat and moisture, become listless animals. To the human family has indeed been given more latitude of habitation than to the brute, for a creative intellect has put us in

possession of means to render existence supportable, even in the prolonged night of the arctic. To man only has the dominion of the elements been granted; he bears his climate with him in some degree, and by the fire dissipates the horror of the frozen solitude, or by the flickering lamp lights up the gloomy darkness of the pole. Other animals are restrained within strict limits by the physical forces; the arctic fox is never found beyond his cheerless homestead, the gavia confines his excursions to the sacred waters of India, the condor sweeps only around the summits of the Andes, and the bird of liberty restrains his flight within the broad limits of our land.

The physical forces, light and heat, are "the irresistible jailors" that have marked out the limits to all tribes. And when, in the lapse of time, the present temperature, and degree of light shall vary on this earth, the existences which now cover its surface shall disappear, and other forms of life adapted to the new state, arise. The aggregate vitality of the globe varies with its physical conditions; life is always manifested, but unlike a supernatural condition, ever bending to material laws. Far off, in that gloomy epoch when youth was in the limbs of the stern reaper Time; when this globe was not yet quite gained from the dominion of Chaos and ancient night; while darkness rested in thick folds upon its face; and the decree had not gone forth to gather together the waters on its surface—the *spirit of God had breathed upon the scene and awakened the seeds of life!* In the granite and porphyry of that dawn of time, are the remains of things that had life. But a change came over the globe; and now the sun has reached the highest point of his periodical brilliancy, dense vapors expand the atmosphere far into the regions of space, scarcely a creature can inhabit the hot seas, and the earth glowing with intolerable day is given up to the dominion of vegetable existences. Impenetrable forests of gigantic ferns, and canes, stately araucarias and beaming cactus cover the soil—but in their deep shade is no cheerful song of bird, nor animated thing. Another epoch; the forest growth has lessened, and now interminable morasses fill the air with warm exhalations, on the islets of the sluggish stream swarm monstrous reptiles, strange dragons, and on the shore basks the lizard megalosaurus stretching his bulky body, of a hundred feet, in the hot sunshine. The graceful plesiosaurus and the serpent fish rule in the ocean, and the night air bears the screams of the flying dragon pterodactyle. *The Saurian epoch, an age of dragons.* Yet again, and the physical conditions of the globe have changed; the mastodon and gigantic elk, the ancient elephant and dinotherion cover its verdant fields and edge its smiling lakes with peaceful denizens—and slowly the time comes on, when man and his congeners replace these elder races.

Thus, through all changes has life been modified by physical causes, to an extent almost incredible; with each change myriads of living machines have become useless and extinct—but *the principle of vitality has remained to warm up new atoms, to invigorate new structures.* Nor is there any reason to assert that the principle has been developed. We see nothing but an adaptation to physical conditions in this diversified chain of being; we discern no trace of a progressive development either in machinery or vitality. In all this period wherever life could be sustained it has been manifested, and the law holds to our day. In the words of the Rev. Dr. Chalmers, "in the leaves of every forest, in the flowers of every garden, in the waters of every rivulet, there are worlds teeming with life, and numberless as are the stars of the firmament." And the mass of mountains, the expanses of the earth, the marble which adorns the dwellings of man,

the iron ore, so invaluable to our race, are made up of the carcases of things that once breathed and moved, that hailed the glad ray of morning, and slumbered in the shade of summer forests, into which life shall yet again be infused.

“Where is the dust that has not been alive?”—YOUNG.

It is the atom which is operative, and not the mass, both in the mineral and animated world. It is the cellule which lives, and the most complicated frame-work is but a community of cellules, depends for the performance of every function, for the development of vital actions, on them. In the sustaining current of the veins, in the membranes, and glands, and every part, are these active molecules ; minute but distinct, elementary in form, but potent in force. Do not these monads respire, and digest, grow and reproduce ? To them there is a period of birth and juvenescence, of maturity and death ; to them are given times of pleasure and of pain, of health and disease, equally with man. *Magnitude is not in the ways of the Infinite a quality of greatness.* Throughout the animal, the cellules, like disciplined corps, sustain their several duties, perform functions differing with their chemical composition and the physical circumstances under which they are placed, and from them there arises a common or organic life ; an expression of the living monads of the system, the resultant of millions of feeble and conspiring forces. Hence, what is called the life of the animal is a complicated result flowing from the rapid and perpetual changes of a chemical nature, occurring in myriads of atoms.

Many willingly admit that in vegetables, chemical forces rule, and that their existence is but a condition of matter, whilst they insist that in animals life is a supernatural state. Yet, there is no function strictly belonging to animals, which is not exactly represented in plants. These are formed of cellules, possessing the same physical characters as in animals ; they betray a similar capillary system, governed by the same laws ; nay, more—they develop vital heat, and many elaborate a reproductive fluid, containing like that of man, living creatures, the spermatozoa. Whence this distinction without a difference ? If animals be environed by a spiritual agency capable of defying material forces, so likewise are plants. But it is said that vegetables secrete starch, respire carbonic acid, and absorb heat. But this is not altogether true, for some genera, and during certain periods, all of them, like animals, inhale oxygen, evolve heat, secrete fat, and decompose azotized matter ; nay, more—they evince motion. And this whenever the same chemical changes occur in them as in animals. Such functions are performed but in a limited degree, and to subserve reproduction, because the office of the plant is to store up and not consume food, to grow rapidly and not expend force.

Electricity is rendered appreciable by the production of regulated motion, by the emission of light, and by molecular effects. Light and heat are developed by chemical means acting on certain forms of matter. These imponderables may be latent, and none are made manifest without appropriate excitation. So it is with life. The cellular figure, a certain chemical composition, and an extreme aptitude to undergo change, characterize the vital molecule. But as we have seen in the case of Volucellæ and Rotiferæ, it may remain latent for ages ; this while appearing as inanimate matter, but putting on life when touched by a drop of water. To excite the phenomena which are supposed to characterize life, as motion and sensation, it is always necessary

that the cellules should be submitted to a proper stimulus. This is, or acts as, a chemical force, and is attended by change or decomposition in one or more molecules. As in the galvanic apparatus each unit of electrical force is accurately represented by the amount of zinc dissolved and rendered effete, so in the animal machine, all vital activity is the precise result of cellular destruction. Each degree of heat, each sensation of pain or pleasure, each movement, every function is produced only at the expense of the death of thousands of living monads. Thus every part of the frame disappears in the course of time, each cellule serving for an instant to manifest *a ray of life and be extinguished in death—the aggregate lighting up the body with vital power*. On this subject the science of chemistry is approaching maturity, and I shall, during the ensuing session, show that every effort of vitality is the rigorous result of the materials of the body consumed in its production; that neither the brain, nor the body, can take on vigorous action except as the consequence of increased chemical change in their particles.

The nutritious products of the vegetable kingdom, resulting from the action of light, heat, and chemical action on mineral and aerial matters, are capable, without further change, of sustaining and developing the animal frame. These principles of the plant, either slightly modified, or for the most part without alteration, pass, by common capillary attraction, to their destined places in the economy, being there converted into its living cellules. These constitute the animal, their decomposition under the chemical necessities of the body develops vital power. Throughout, in the formation, destination and death, the chemical force is operative; active to build up the beautiful frame-work, and active to destroy. To attribute these changes to other agencies is supererogatory and unphilosophical, for this one is sufficient.

The confusion, which exists in the minds of men, arises from the common error made in investigating this matter. The manifestations of existence, in the human family, are always appealed to as constituting the phenomena of life, it being overlooked that there is no necessary connection between the mind and vitality, and that the highest attainments of the animal are unassociated with intellect. Man has not the fleetness of the chamois, the eye of the eagle, nor the voice of the nightingale. The mind does, indeed, influence the body, and is in some degree impeded in its manifestations by its material association, but it does not endow the frame with peculiar properties, nor develop its vitality. Their nature is in all things opposed. The body frail and of short duration, passing rapidly into decay—the mind immortal. The events of youth! how clearly they arise before us; the pleasant lawn, the shady woods, the merry sportsmen of that smiling lake; how cherished is the remembrance of those guileless hours, each action of that distant time is deeply set in the memory, but every atom of that body has passed away. The daily waste goes on in the system without *landmark to indicate its progress, but there remains a shadow of every deed—there exists through all change a guardian spirit, to admonish and record*. A body imperfect, controlled within narrow limits and hurrying to destruction; a mind allied to the infinite, which no space can bound, no time destroy.

As we watch the sun sinking to rest on a summer's evening, tinged with his declining rays the attendant clouds, as twilight purples over the sky, as shadows grow deeper and deeper on the earth and new born zephyrs surround us with the last odors of flowers, as star by star lights up the vault of heaven—does not an instinctive interest, a fellowship in those distant worlds, enter the soul? Does not a calm assurance of brighter days far off in those islands of the blest, pass into the mind? To all our race, to the repining

captive shut out from other hopes, to the humble and the ambitious, this presentiment belongs. It is an instinct of the mind. And herein is the mind, which is immortal, an atom of celestial systems, distinguishable from the transitory body.

“Hope springs eternal in the human breast,
Man never is, but always to be, blest.
What future bliss he gives not thee to know,
But gives that hope to be thy blessing now.”

If, then, the connections between the vital and chemical forces are so close that the line of distinction cannot be drawn; if the physical laws, which form a part of chemistry, are so powerful as to modify life, and if, in every question of physiology and pathology this science is our only rational guide, is it not of some importance for the physician to inform himself in it? It will, therefore, be my object, in the course we are about undertaking, to develop chiefly those parts of the science which throw light on medicine. I invite you to this study because it is by no means difficult or destitute of interest. It is, moreover, the way I would persuade you to take for the attainment of professional eminence. You are entering the profession at a transition period, when the authority of speculation and antiquity is expiring, when demonstration is becoming the only test of truth, and your choice will be with the medico-chemical school, or with the school of mystery and empiricism. You enter it at a time unrivalled for mental vigor; knowledge does not now creep, but bounds forward with electric speed. The light of a new fact scarcely glimmers in the morning, and ere noon it is in the zenith, glorious with truth. This department of chemistry has already engaged the attention of the best men of Europe, and produced more brilliant reputations within the past few years than all other courses. It is, however, but little studied amongst us, and the field is open for you. I trust, at all events, that I have said enough to persuade that chemistry is useful to your studies, and a knowledge of it is worthy of your attention as physicians.

PHILADELPHIA COLLEGE OF MEDICINE,

FIFTH, SOUTH OF WALNUT STREET.

THE SPRING AND SUMMER COURSE OF LECTURES FOR 1848, will be commenced on Monday, March 6th, 1848, and be continued four months. The faculty are:

JAS. McCLINTOCK, M. D., *General, Special and Surgical Anatomy.*

J. R. BURDEN, M. D., *Materia Medica and Therapeutics.*

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For further information inquire of

JAMES McCLINTOCK, M. D., DEAN,

No. 1 North Eleventh Street.

Philadelphia, December, 1, 1847.

JUST PUBLISHED,
A NEW MEDICAL DICTIONARY;

BY

D. PEREIRA GARDNER, M. D.,
*Professor of Chemistry, &c., in the Philadelphia College of
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